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Remarks

Claims 1-21 are pending in this Application. Claims 1-5, 12-15, 20 and 21 are rejected under 35 U.S.C. §102(b) as being anticipated by prior art cited by the Examiner. Claims 1, 2, 9, 12, and 19 are rejected under 35 U.S.C. §102(b) as being anticipated by prior art cited by the Examiner. Claims 1 and 11 are rejected under 35 U.S.C. §102(b) as being anticipated by prior art cited by the Examiner. Claims 1, 7, 10, 12, and 17 are rejected under 35 U.S.C. §103(a) as being obvious based on prior art cited by the Examiner. Claims 1, 2, 6, 12, and 16 are rejected under 35 U.S.C. §103(a) as being obvious based on prior art cited by the Examiner. Claims 8 and 18 are objected to as being dependent on a rejected claim but are allowable if rewritten in independent form including all limitations of the base claims and any intervening claims.

Objection to the Claims

The Examiner finds claims 8 and 18 to be allowable if rewritten in independent form including all limitations of the base and any intervening claims. Accordingly, claim 8 has been rewritten in independent form to include all limitations of original claim 1. Claim 18 has been rewritten in independent form to include all limitations of original claim 12. Applicant believes that these amendments overcome the objection and respectfully requests allowance of claims 8 and 18.

Rejections under 35 U.S.C. §102(b), Carlson Reference

Claims 1-5, 12-15, 20 and 21 are rejected under 35 U.S.C. §102(b) as being anticipated by Carlson (U.S. Patent No. 1,628,652). The Examiner finds that Figure 1 of Carlson:

[S]hows a tube 9 in a connecting rod 10 for delivering oil from a crankshaft end 15 to a piston end 11 where it exits through a plurality of holes 13 to the top and sides.

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Applicant submits that the plurality of holes 13 of Carlson are actually formed in a tube 12, not the duct 9 in the connecting rod 10. The plurality of holes 13 of Carlson are not "formed in the second end [of the connecting rod] for spraying lubricant received from the tube onto a piston" as required by amended claims 1 and 12 and by claim 20. Rather, they are formed in the tube 12. Likewise, the Carlson structure does not:

distribut[e] lubricant received from the tube through spray holes
formed in the pin bore end of the [connecting rod] body ...
(emphasis added)

as recited by claim 21.

Accordingly, Applicant submits that the rejection under Section 102(b) rejection based on Carlson is overcome and that independent claims 1, 12, 20 and 21, as well as claims 2-3, 5, 13 and 15-19 which respectively depend therefrom are allowable.

Rejections under 35 U.S.C. §102(b), Stearns Reference

Claims 1, 2, 9, 12, and 19 are rejected under 35 U.S.C. §102(b) as being anticipated by Stearns (U.S. Patent No.1,959,279). Stearns provides that lubricant will flow:

... through the tube 28 to the oil groove 13 in the bearing 9. It will then flow through the port 22 in the wrist pin 17 and to the reservoir formed between the bore 18 of the wrist pin and the outer wall of liner 23, thence through the upper and lower ports 21 to a partial outer reservoir formed by the outer wall of the wrist pin, and the bores of the bosses 4 and the flange 5. It will then flow through the apertures 26 provided in the bosses 4 into the interior of the piston. . . .

(page 2, lines 64-74)

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Notably, none of the oil flow paths taught by Stearns are "spray holes formed in the second end [of the connecting rod] for spraying lubricant received from the tube onto a piston" as required by amended claims 1 and 12. The only "holes" taught by Stearns are the ports 21, 22, and the apertures 26. The ports 21 and 22 of Stearns are formed in the wrist pin 17, not in the connecting rod 9. The apertures 26 are "provided in the bosses 4" as taught at page 2, lines 73, 74 and shown in Figure 1 and 5. The apertures 26 are not formed in the connecting rod 9. In fact, the connecting rod 9 of Stearns is not formed with any holes.

Accordingly, Applicant submits that the rejection under Section 102(b) based on Stearns is overcome and that claims 1 and 12 as well as claims 2, 9 and 19 which respectively depend therefrom are allowable.

Rejections under 35 U.S.C. §102(b). Volkel Reference

Claims 1 and 11 are rejected under 35 U.S.C. §102(b) as being anticipated by Volkel (U.S. Patent No. 3,482,467). Volkel discloses a tube is for carrying lubricant from the fork-end 21 of a connecting rod 14 to the wrist pin end 18 of the connecting rod 14. The wrist pin end 18 and the fork-end 21 of Volkel are "cast integral with a tubiform midsection 23, having for example an oval cross section that is symmetrical about an axis." (col. 2, lines 5-7) The "oil tube 51 could be inserted as shown [in Figures 1-3] on the axis. A hole 52 in the end 18 could be used to spray oil on the piston 12 to cool the underside of the piston top." (col. 3, lines 27-29)

The tube 51 of Volkel is inserted within the tubiform rod 14, as stated above and as clearly shown in Figures 1-3. Volkel's tube 51 is not "external to the [connecting rod] body between the first and second ends" as required by claim 1. At least for this reason, Volkel does not anticipate claim 1 nor claim 11 which depends therefrom and the rejection for claims 1 and 11 under Section 102(b) is believed to be overcome.

Hole 52 is the only hole disclosed by Volkel for spraying oil onto the piston 12. Volkel teaches that hole 52 sprays oil "as the piston to cool the underside of the piston top." (col. 3, lines 28-29) Volkel does not disclose "a plurality of spray holes formed in the second end for spraying lubricant received from the tube onto a piston" as required by amended claims 1 and 11. For this reason also, Applicant submits that Volkel does not anticipate claims 1 and 11 and the rejection of claims 1 and 11 under Section 102(b) is believed to be overcome.

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Rejections under 35 U.S.C. §103(a), Carlson Reference

Claims 1, 7, 10, 12, and 17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Carlson (U.S. Patent No. 1,628,652). "An obviousness rejection requires some teaching, suggestion or motivation to modify or combine the references." (MPEP 2143.01) "The desirability for making the proposed modification or combination must be found in the references or in the Examiner's line of reasoning." (MPEP 706.02(j))

As discussed above, the holes 13 of Carlson are not "formed in the second end [of the connecting rod] for spraying lubricant received from the tube onto a piston" as required by amended claims 1 and 12. No suggestion or motivation is provided to form holes in the rod 10 of Carlson for this purpose. According, the rejection of claims 1 and 12, and of claims 7, 10 and 17 which respectively depend therefrom, is believed to be overcome.

Rejections under 35 U.S.C. §103(a), Speier and Volkel References

Claims 1, 2, 6, 12, and 16 are rejected under 35 U.S.C. §103(a) as being unpatentable over Speier (German Patent No. DE 4325903 in view of Volkel (U.S. Patent No. 3,482,467). The Examiner finds that:

Speier shows in figure 2 bushings 15 and 16 with a channel 17 there between. The bushings have axially extending grooves thereon. There is a passage 9 connecting the crankshaft end to the piston end and is machined into the rod.

Speier discloses an opening 11 formed in structure 4. Assuming that the structure 4 is part of the rod 3, such that the opening 11 is formed in the rod, Speier still fails to teach "a plurality of spray holes formed in the second end for spraying lubricant received from the tube onto a piston" as required by amended claims 1 and 12. Volkel also fails to disclose a plurality of holes (Volkel discloses only hole 52, as discussed above). Neither reference provides a suggestion or motivation to provide "a plurality of spray holes."

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Accordingly, for at least this reason, the rejection under Section 103(a) over Speier in view of Volkel of claims 1 and 12, and of claims 2, 6 and 16 which respectively depend therefrom, is believed to be overcome. If an independent claim is nonobvious under 35 USC §103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1569 (Fed. Cir. 1988). Dependent claims 2, 6, and 16 depend from independent claims 1 and 12. Because, as discussed above, claims 1 and 12 are not obvious, claims 2, 6 and 16 which respectively depend therefrom cannot be obvious.

Claims 6 and 16 each require "first and second bushing members positioned in the pin bore forming a channel therebetween and each having a plurality of squirt grooves formed therein, wherein lubricant is received from the second drilled passage into said channel and distributed to a piston dome and a piston skirt/bore interface through the plurality of squirt grooves."

As provided in paragraph [0033] of the present Application, the squirt grooves 86, 88 formed in bushing members 80, 82 "distribut[e] the lubricating fluid as illustrated by the arrows A of Figure 6 This embodiment provides . . . piston dome cooling and the piston skirt/bore interface lubrication."

The Examiner finds that the bushings of Speier have axially extending grooves thereon. Applicant submits that this conclusion by Examiner is not apparent from Figure 2 nor from the English language abstract available for Speier. It appears from Figure 2 that the only outlet for oil fed through the channel 17 is out through the hole 11, which will presumably lubricate the top or dome area of the piston of Speier. However, Speier provides no squirt grooves that distribute lubricant "to a piston skirt/bore interface" as required by claims 6 and 16. Because the structure 1 of Speier closes off the outer sides of the bushings 15, 16, it is clear that Speier cannot provide squirt grooves that distribute lubricant to "a piston dome and a piston skirt/bore interface" as required by amended claims 6 and 16. Speier discloses only one hole 52 in the connecting rod "used to spray oil on the piston 12 to cool the underside of the piston top" (col. 3, lines 28-29). Volkel also does not suggest or disclose the squirt grooves of claims 6 and 16.

For this reason also, Applicant submits that claims 6 and 16 are not obvious over Speier in view of Volkel and that, accordingly, the Section 103(a) rejection is overcome.

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New Claims 22 and 23

At paragraph [0023], the Specification provides:

For lubrication, oil from the upper main bearing groove enters the main journal channel 22, and passes through the main journal of the crankshaft 14, through channel 24 within the crank arm 12, and into the rod journal 16. From channel 24, the oil passes through the openings 26, 28 in the upper rod bearing 30, and into the crescent shaped annulus 32 formed in the upper crank bore end 34 of the connecting rod 18. The crescent shaped annulus 32 is preferably machined to about 3 mm in width and about 1.5 mm at its deepest point.

Furthermore, the Specification provides at paragraph [0030]:

The size, shape, position and number of ports, such as ports 26, 28, in the upper rod bearing shell 30 affect not only the quantity of oil delivered, but also determines the timing of the ultimate squirt at the opposite end of the connecting rod. The openings in the rod bearing 30 can be simple holes or elongated slots with the nominal diameter or width being on the order of 3 mm. A double squirt may be accomplished by having two openings 26, 28 in the rod bearing 30. Preferably, two 3 mm diameter holes are placed 30 degrees on either side of the vertical center line of the connecting rod. It is undesirable to locate the openings 26, 28 within plus or minus 20 degrees of the rod's centerline, as the openings 26, 28 can be detrimental to oil film thickness.

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Thus, the invention provides a novel crescent-shaped annulus and rod-bearing openings for distributing lubricant to the first passage and ultimately to the plurality of spray holes formed in the second end of the rod body. New dependant claims 22 and 23 capture these novel features. None of the prior art discussed by the Examiner incorporates such features. The Specification, including paragraphs [0023] and [0030] cited above, support claims 22 and 23 such that no new matter is presented by these claims. Additionally, because claims 22 and 23 depend from claim 1, which, as discussed above, is allowable, claims 22 and 23 are also allowable.

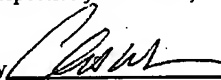
Conclusion

This amendment is believed to be fully responsive to the Office Action mailed July 29, 2004. The amendment and remarks in support of the rejected claims are believed to place remaining claims 1-3, 5-13, 15-21 and new claims 22 and 23 in condition for allowance, which action is respectfully requested.

Please charge any additional fees due to Deposit Account number 07-0960.

Respectfully submitted,

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Date: 10/27/04

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